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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/757,391

01/15/2004

You-seop Lee

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4946

27849

7590

10/20/2006

LEE & MORSE, P.C.  
3141 FAIRVIEW PARK DRIVE  
SUITE 500  
FALLS CHURCH, VA 22042

EXAMINER

MRUK, GEOFFREY S

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 10/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/757,391

Applicant(s)

LEE ET AL.

Examiner

Geoffrey Mruk

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 and 21-23 is/are pending in the application.
- 4a) Of the above claim(s) 22 and 23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

Newly submitted claims 22 and 23 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: species 2 and species 3 as stated in the restriction requirement dated 7 February 2006.

Since applicant has received an action on the merits for the originally presented species 1, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 22 and 23 are withdrawn from consideration as being directed to a non-elected species. See 37 CFR 1.142(b) and MPEP § 821.03.

### ***Claim Objections***

Claim 10 objected to because of the following informalities: claim 10 lacks antecedent basis for the term "atmospheric pressure." For examination purposes, the examiner will construe "atmospheric pressure" to mean surface tension. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 states, "(b) forming an electric field directed toward an outlet of the nozzle on a front end of the nozzle, the front end of the nozzle being surrounded by a hydrophobic layer; (c) modifying a magnitude and location of the electric field to vary a surface tension of ink to separate ink droplets having a predetermined volume from ink and to move the separated ink droplets within the front end of the nozzle toward the outlet of the nozzle." The examiner is not sure to what the metes and bounds of the invention is since the specification, specifically paragraph 0061, states "This application of voltage causes the surface property of the hydrophobic layer 130 at a location corresponding to the first and second electrode pads 151 and 152 to change to a hydrophilic property." Does the electric field change the chemical composition of the hydrophobic layer (element 130) or does the electric field create a force to overcome the surface tension of the ink inside the nozzle in order to eject a drop from an outlet? Therefore, one of ordinary skill in the art would not be able to use the invention with the disclosed ejection method steps (paragraphs 0060-0062).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-10 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Hotomi et al. (US 5,144,340).

With respect to claim 1, Hotomi discloses a method of ejecting ink (Column 16, lines 19-68; Column 17, lines 1-9) comprising:

(a) filling a rear end of a nozzle (Fig. 15, element 1n) with ink using a capillary force (Column 16, line 31), the rear end of the nozzle being surrounded by a hydrophilic layer (Column 6, lines 48-54);

(b) forming an electric field (Fig. 15, element 18x) directed toward an outlet of the nozzle on a front end of the nozzle (Fig. 15, element 17x), the front end of the nozzle being surrounded by a hydrophobic layer (Column 7, lines 17-23);

(c) modifying a magnitude (Fig. 15, elements  $\Phi 1$ -  $\Phi 3$ ) and location (Fig. 15, elements 5x-7x) of the electric field to vary a surface tension of ink to separate ink droplets having a predetermined volume from ink and to move the separated ink droplets within the front end of the nozzle toward the outlet of the nozzle (Column 16, lines 21-29); and

(d) ejecting the separated ink droplets through the outlet of the nozzle (Fig. 16, element 1n').

With respect to claim 2, Hotomi discloses forming an electric field (Fig. 15, element 18x) directed toward the outlet of the nozzle (Fig. 15, element 17x) comprises: sequentially applying a voltage (Column 16, lines 38-41) to a plurality of electrode pads (Fig. 15, elements 5x-7x), the plurality of electrode pads being disposed on the front end of the nozzle at predetermined intervals in a lengthwise direction of the nozzle (Column 16, lines 19-68; Column 17, lines 1-9).

With respect to claim 3, Hotomi discloses varying the surface tension of ink comprises: lowering the surface tension of ink adjacent to one of the plurality of electrode pads (Fig. 15, elements 5x-7x) to which the voltage is applied so that a contact angle of ink with respect to the hydrophobic layer is reduced (Column 16, lines 19-68; Column 17, lines 1-9).

With respect to claim 4, Hotomi discloses wherein forming the electric field (Fig. 15, element 18x) and varying the surface tension of ink comprises: sequentially applying a voltage (Column 16, lines 38-41) to a first electrode pad and a second electrode pad of the plurality of electrode pads (Fig. 15, elements 5x-7x) to move ink within the front end of the nozzle to a position corresponding to a location of the second electrode pad; and cutting off the voltage (Column 17, lines 3-7) applied to the first electrode pad to separate the ink droplets from ink (Column 16, lines 19-68; Column 17, lines 1-9).

With respect to claim 5, Hotomi discloses after the separation of the ink droplets from ink, (c) further comprises: cutting off the voltage (Column 17, lines 3-7) applied to the second electrode pad and sequentially applying a voltage to at least one electrode pad of the plurality of electrode pads disposed after the second electrode pad to move

the separated ink droplets toward the outlet of the nozzle (Column 16, lines 19-68; Column 17, lines 1-9).

With respect to claim 6, Hotomi discloses an area of each of the plurality of electrode pads is variable so that a volume of the ink droplets is adjustable (Column 17, lines 15-21).

With respect to claim 7, Hotomi discloses a moving speed of the separated ink droplets in the front end of the nozzle (Fig. 15, element 17x) is adjusted by a time difference during the sequential application of the voltage to the plurality of electrode pads (Column 17, lines 34-37).

With respect to claim 8, Hotomi discloses wherein (d) further comprises: cutting off the voltage (Column 17, lines 3-9) applied to an electrode pad (Fig. 15, elements 5x-7x) where the ink droplets are located, prior to ejecting the separated ink droplets (Column 16, lines 19-68; Column 17, lines 1-9).

With respect to claim 9, Hotomi discloses wherein in (d), the ejection of the separated ink droplets is performed by an electrostatic force (Fig. 15, element 18x).

With respect to claim 10, Hotomi discloses wherein in (d), the ejection of the separated ink droplets is performed by lowering an atmospheric pressure (Column 17, lines 1-9) around the outlet of the nozzle (Column 16, lines 19-68; Column 17, lines 1-9).

With respect to claim 21, Hotomi discloses disposing an insulating layer (Fig. 15, elements 2x, 10x) in the front end of the nozzle (Fig. 15, element 17x) in a lengthwise

direction between the electrode pads and the hydrophobic layer (Column 16, lines 19-68; Column 17, lines 1-9).

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lerat et al. (US 6,435,665 B2) discloses a device for controlling fluid movement in an ink jet printer. However, Lerat does not disclose an electric field used as an external force to eject ink from a nozzle outlet.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of



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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is 571 272-2810. The examiner can normally be reached on 7am - 330pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on 571 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

GSM  
10/3/2006



**STEPHEN MEIER**  
**SUPERVISORY PATENT EXAMINER**